Haley & Aldrich, Inc.
6500 Rockside Road, Suite 200
Cleveland, OH 44131-1463
216.739.0555

15 January 2016
File No. 40616-007

Associated Electric Cooperative, Inc.
New Madrid Power Plant
New Madrid County, Missouri

Attention: Russ Weatherly
Supervisor, Land and Water Resources

Subject: Initial Annual CCR Landfill PE Inspection
Utility Waste Landfill
New Madrid Power Plant
New Madrid County, MO

Mr. Weatherly:

Enclosed please find our Initial Annual Coal Combustion Residuals (CCR) Landfill Inspection Report for the Associated Electric Cooperative, Inc. (AECI) Utility Waste Landfill (UWL) located at the New Madrid Power Plant (NMPP) in New Madrid County, Missouri.

We completed our site visit for the inspection of the landfill on 16 December, 2016. This work was performed by Haley & Aldrich, Inc. (Haley & Aldrich) on behalf of AECI in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257.

The scope of our work was to complete 1) a review of available information on the landfill, 2) a visual inspection of the landfill, 3) and prepare the enclosed report. We did observe erosion along the active filling area sideslopes that is recommended for repair and continued monitoring.

Thank you for inviting us to complete this inspection and please feel free to contact us if you wish to discuss the contents of the report.

Sincerely yours,
HALEY & ALDRICH, INC.

Steven F. Putrich, P.E.
Vice President

Enclosures

\\cle\common\Projects\40616_AECI-CCR ELG Management Support\107\Landfill Annual inspection\2016-0115-HAI-AECI-New Madrid-Annual PE Inspection rpt_F.docx

HALEY ALDRICH

www.haleyaldrich.com

REPORT ON

INITIAL ANNUAL CCR LANDFILL PE INSPECTION
UTILITY WASTE LANDFILL
NEW MADRID POWER PLANT
NEW MADRID COUNTY, MISSOURI

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Associated Electric Cooperative, Inc.
New Madrid County, Missouri

File No. 40616-107
January 2016

TABLE OF CONTENTS

List of Figures

1. Description of Project

1.1 GENERAL

1.1.1 Authority

Haley & Aldrich, Inc. (Haley & Aldrich) has been contracted by Associated Electric Cooperative, Inc. (AECI, Owner) to perform an Initial Annual CCR Landfill Inspection for Phase I of the Utility Waste Landfill (UWL) located at the New Madrid Power Plant in New Madrid County, Missouri. This work was completed in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257, specifically §257.84.

1.1.2 Purpose of Work

The purpose of this inspection was to visually observe and evaluate the present condition of the landfill to evaluate that the design, construction, operation, and maintenance of the CCR landfill is consistent with recognized and generally accepted good engineering standards. The visual inspection is intended to identify signs of distress or malfunction of the landfill, should they exist. This report addresses those items observed that are disrupting or have the potential to disrupt the operation and safety of the landfill.

The inspection was divided into three parts: 1) obtain and review readily available reports, investigations, and data pertaining to the landfill; 2) perform a visual inspection of the site; 3) prepare this report presenting our observations and recommendations for any repairs or remedial actions.

1.2 DESCRIPTION OF PROJECT

1.2.1 Location

The Utility Waste Landfill is located approximately 1.7 miles southwest of the New Madrid Power Plant, in New Madrid County, Missouri. The landfill is accessed from the plant site along a gravel access/haul road. Access to the plant and landfill is restricted by full time security and fences and gates at the plant.

1.2.2 Owner/Operator

The landfill is owned, operated and maintained by AECI.

	Landfill Owner / Operator
Name Mailing Address Town	AECI New Madrid Power Plant 41 St. Jude Industrial Park Marston, MO 63869

1.2.3 Purpose of the CCR Landfill

The New Madrid Power Plant is a two-unit coal-fired power plant, with a generating capacity of approximately 1,200 Megawatts. As part of plant operations, the landfill was opened for the purpose of disposing CCRs, including fly ash, boiler slag, coal waste, ponded ash, minor amounts of miscellaneous wastes, and other related wastes/byproducts produced at the New Madrid Power Plant.

1.2.4 Description of the Landfill

The CCR landfill has an approximate total net storage airspace of 22.1 million cubic yards per the Missouri Department of Natural Resources (MDNR) approved Landfill Construction Permit Application (CPA), with an approximate expected total footprint of 250 acres. The total design capacity and footprint will be comprised of ten phases at 25 acres each. At the time of the inspection, only Phase I of the landfill was operational and receiving waste. Phase III of the landfill is currently under construction.

The Phase I landfill was constructed with a perimeter berm around each side. The perimeter berm, which also serves as an access road, is roughly 6 feet in height when measured to the existing topography outside of the landfill, and varied in height from 6 feet to 10 feet when measured to the interior grades of the landfill cell upon construction. The Phase I landfill base liner system consists of a 24-inch compacted soil liner, a 60-mil textured HDPE geomembrane liner, a geocomposite drainage layer, and a protective soil layer (24-inches on cell bottom and 12-inches on cell side slopes). The leachate collection system is comprised 6-inch HDPE leachate collection pipes that drain to a 10-inch HDPE leachate header pipe. The leachate header pipe drains by gravity to a leachate collection manhole, located outside of the landfill, where leachate is then pumped by a submersible pump to the leachate pond. The leachate pond is equipped with a load-out structure and pump. Leachate is pumped into trucks and hauled to the landfill where it is sprayed for use as dust control.

Stormwater runoff from the landfill is prevented by the perimeter berms. Stormwater is collected in ditches that drain from a high point in the northeast corner of the landfill towards the low point in the southwest corner. Stormwater is collected in the southwest corner of the landfill cell, in accordance with the intended design, and then passes through the landfill berm and into a ditch via a 24-inch HDPE pipe. The ditch drains to the east and empties into the sedimentation pond via a 24-inch HDPE pipe. The sedimentation pond is pumped periodically to the Lined Ash Pond at the power plant and subsequently evaporated or discharged through the existing NPDES permitted outfall, consistent with the CPA.

Trucks haul CCR from the plant to the landfill for disposal via a dedicated haul road. The CCR is disposed on the top of the landfill where it is spread in 4-6 inch thick lifts the following day by a GPS equipped dozer. Compaction is achieved by multiple passes of the dozer as the CCR is spread and shaped for positive drainage.

Based on recent generation and disposal data provided by AECI, and assuming in-place compacted CCR's have a density of 85 lb/cf (as assumed in the CPA), the landfill receives approximately 69,000 cubic yards of CCR per year.

1.2.5 Landfill Size

The landfill storage volume at the time of the inspection is estimated to be approximately 770,000 cubic yards. This estimate is based on a volumetric comparison of the top of protective cover grades (from Phase I Construction) with topographic survey data from October 2014 plus a prorated 14 months of

operation (October 2014 – December 2015) at a disposal rate of 69,000 cubic yards per year. Disposal rate data was provided by AECI.

1.3 PERTINENT ENGINEERING DATA

1.3.1 Design and Construction Records

Phase I of the Landfill was constructed in 2007 and began operations in 2008 after the MDNR Operating Permit was granted. The Landfill Construction Permit Application (CPA), Phase I construction drawings, and Phase I Operating Permit Application, as well as the Operating Permit issued by MDNR Solid Waste Management Program (SWMP), were provided by AECI for review as part of this inspection.

1.3.2 Operating Records

Other than the 7-day inspection records being kept by AECI personnel there were no other landfill operational records for review at time of inspection.

2. Inspection

2.1 VISUAL INSPECTION

On 16 December 2015, Haley & Aldrich completed a visual inspection of the landfill. The following paragraphs describe the conditions observed during the inspection. In addition, refer to the photographs and checklist forms included in Appendices A, and B, respectively for additional comments.

2.1.1 General Findings

2.1.1.1 Landfill Perimeter Berms

The perimeter berms of the landfill were inspected and no significant erosion, uncontrolled vegetation, or other signs of distress were observed on the inner or outer side slopes. Evidence of irregular slope movement, sloughing, slides, sinkholes, or settlement that would indicate instability in the perimeter berms was not observed during this inspection.

2.1.1.2 Landfill Top

At the time of the inspection, no active CCR placement was taking place. CCRs had been disposed from trucks on the top of the landfill the previous night and were to be spread by a tracked dozer later that day. This sequence of disposal and spreading CCRs in 4-6 inch lifts is typical based on discussion with AECI personnel. CCRs are placed in a way to promote positive drainage off the top of the landfill. In general, we did not observe standing water, settlement, significant erosion, or other signs of distress on the top of the landfill.

2.1.1.3 Landfill Side Slopes

Small erosion rills, less than 6-inches deep, and several erosion rills between 6 and 12-inches deep were observed in several locations on the landfill side slopes. Erosion rills less than 6-inches deep are not an immediate concern but should be monitored regularly by AECI personnel. When erosion rills exceed 12-inches deep, AECI should consider repairing the area and make modifications as needed to prevent future erosion. Based on discussion with plant personnel, the side slopes are maintained and fine graded with a dozer periodically to repair erosion rills. Typical maintenance is conducted on the side slopes once CCR's in the perimeter ditches and along the side slopes are dry enough to perform the grading. At the time of this inspection, intermediate soil cover had not been placed on any of the landfill side slopes or landfill top.

2.1.1.4 Sedimentation Pond

The sedimentation pond was being pumped to the Lined Ash Pond during the inspection. Based on discussion with plant personnel, the sedimentation pond is pumped periodically and is typically pumped to a water level where pump suction can no longer be maintained. No significant erosion, uncontrolled vegetation, or other signs of distress were observed on the inner or outer side slopes of the sedimentation pond.

2.1.1.5 Leachate Collection System

The leachate collection pump system was recently cleaned and as routine system maintenance, parts of the pump system were replaced. Based on discussion with plant personnel, the leachate collection system is operating as intended.

2.1.1.6 Leachate Collection Pond

No significant erosion, uncontrolled vegetation, or other signs of distress were observed at the leachate collection pond. The level in the pond was below the posted acceptable operating level. Based on discussion with AECI personnel, the leachate pond is periodically pumped into a haul truck and sprayed on the landfill for dust control. Plant personnel have not encountered problems keeping the water level in the leachate pond controlled, even during rainy periods. Plant personnel report that beyond normal maintenance of the leachate pump system, no operational issues have been encountered.

2.2 CARETAKER INTERVIEW

We spoke with Mr. Tim Backes of AECI concerning the operations and maintenance of the landfill. Information provided by AECI personnel has been incorporated into this report.

2.3 OPERATIONS AND MAINTENANCE

The landfill is currently operated and maintained by AECI personnel. Operation of the landfill includes CCR hauling and placement, maintenance, and weekly inspections. Weekly inspections are performed by AECI personnel.

The AECI qualified personnel monitor and inspect the landfill every 7 days and keep inspection records in the operating record as required by 40 CFR Part 257. These 7-day inspections generally include:

- Observation of landfill for signs of instability;
- Observation of stormwater management system;
- Observation of leachate collection system and leachate collection pond;
- Evidence of run-off of CCR's

Haley & Aldrich reviewed the 7-day inspection records as part of the annual inspection.

2.4 STRUCTURAL STABILITY

The landfill was visually observed to be stable with no sloughing, slides or evidence of settlement observed. Some minor erosion rills were observed at several locations along the side slopes of the landfill and these should be monitored in the future and repaired if they continue to erode. Evidence of irregular slope movement, sloughing, slides, sinkholes, or settlement that would indicate instability in the landfill was not observed during this inspection.

3. Assessments and Recommendations

3.1 ASSESSMENTS

Based on our visual observations, no items were observed to have the potential to create structural weakness which could affect the operation and safety of the landfill, and the operation and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards.

3.2 RECOMMENDATIONS

We recommend the following items be monitored as part of on-going CCR unit operation:

- Consistent with current AECI maintenance and operation procedures, erosion rills should be monitored along landfill side slopes and maintenance should be conducted to repair areas where erosion rills greater than 12 inches become apparent. We recommend that AECI evaluate causes of erosion (e.g. stormwater flow paths) and determine if measures or re-direction of that flow path are appropriate to limit the erosion development.

4. Certification

The assessment of the general condition of the landfill is based upon available data and visual observation. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.

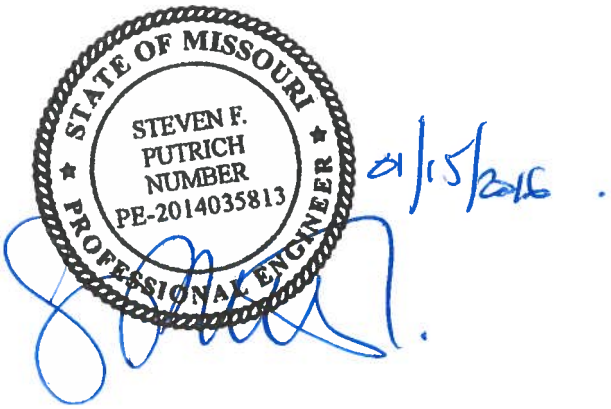
In reviewing this report, it should be realized that the described condition of the landfill is based on observations of field conditions at the time of inspection, along with other data available to the inspection team.

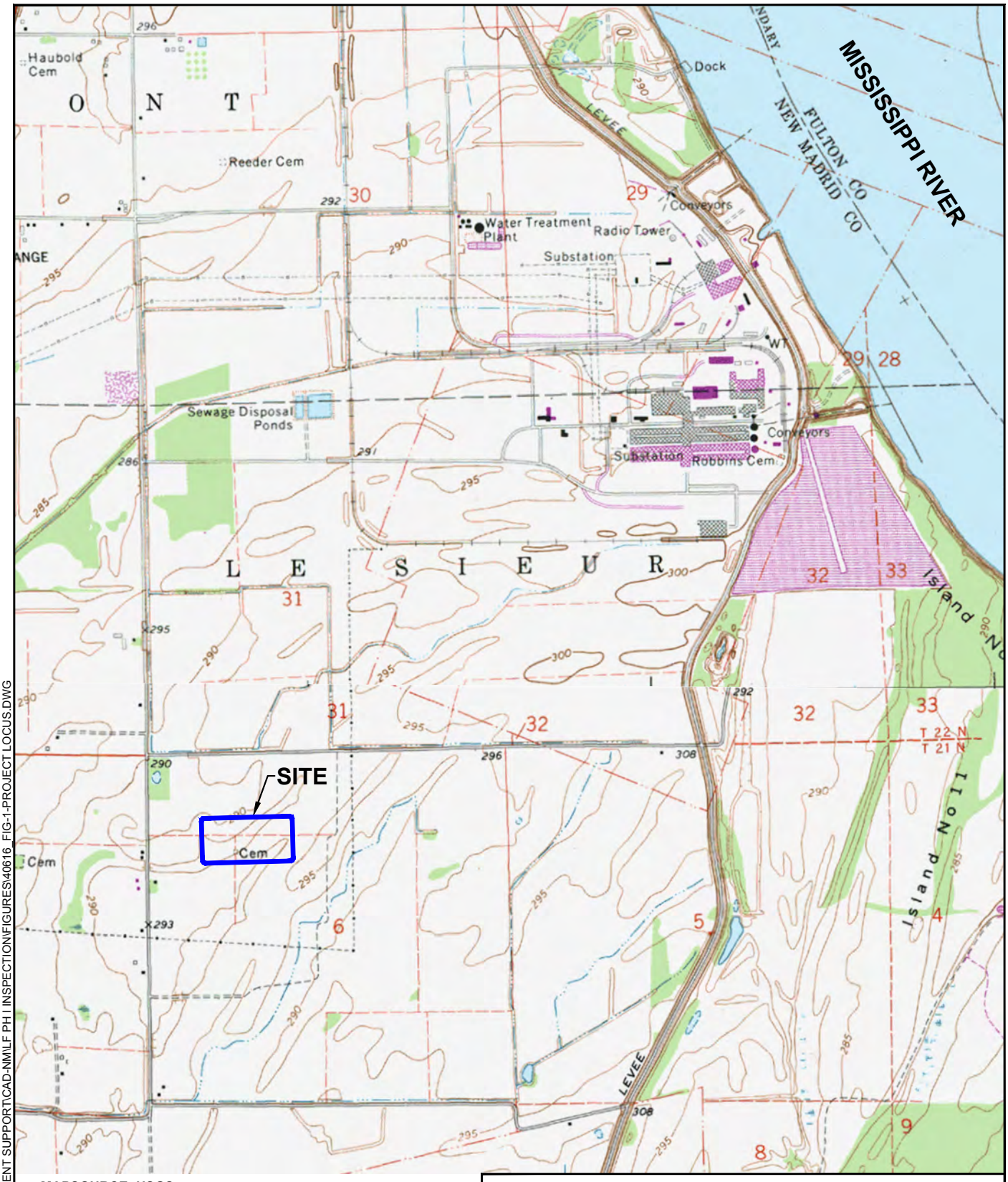
It is important to note that the condition of a landfill depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the landfill will continue to represent the condition of the landfill at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Signed: _____
Consulting Engineer

Print Name: Steven F. Putrich
Missouri License No.: 2014035813
Title: Vice President
Company: Haley & Aldrich, Inc.

Professional Engineer's Seal and date:





MAPSOURCE: USGS
NEW MADRID NORTH
NEW MADRID SOUTH

HALEY ALDRICH

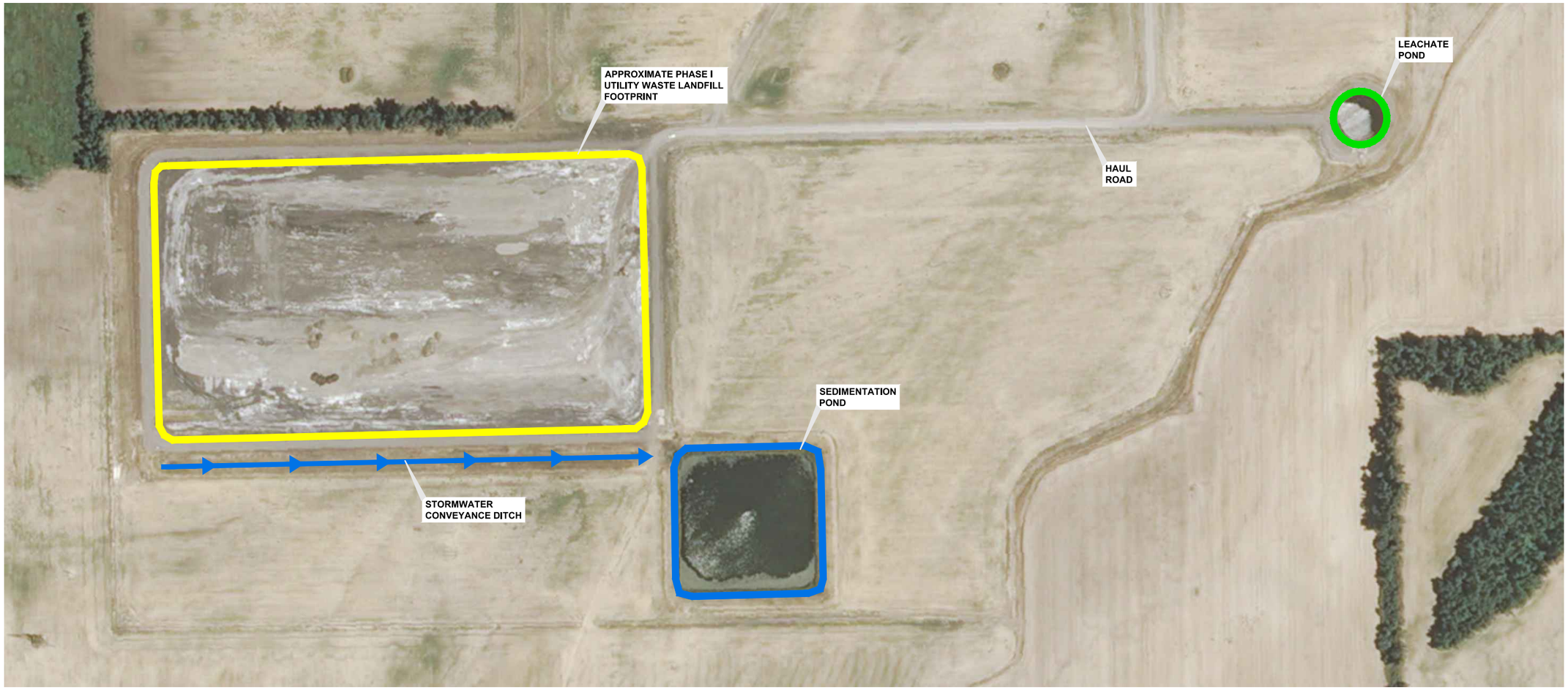
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT
LANDFILL INSPECTION

PROJECT LOCUS

APPROXIMATE SCALE: 1" = 2000'
JANUARY 2016

FIGURE 1

BLEVINS, BRETT Printed: 1/15/2016 12:13 PM Layout: PROJECT LOCUS
G:\40616_AECI-CCR ELG MANAGEMENT SUPPORT\CAD-NM\LF PH I INSPECTION\FIGURES\40616_FIG-1-PROJECT LOCUS.DWG



NOTES

1. AERIAL PHOTOGRAPH BASED ON LIDAR DATA PROVIDED BY PICTOMETRY INTERNATIONAL CORP. AERIAL SURVEY CONDUCTED BETWEEN 10/4/14 AND 10/8/14.
2. FIELD INSPECTION WAS PERFORMED ON DECEMBER 16, 2015.

N

0 300 600

SCALE IN FEET

HALEY ALDRICH

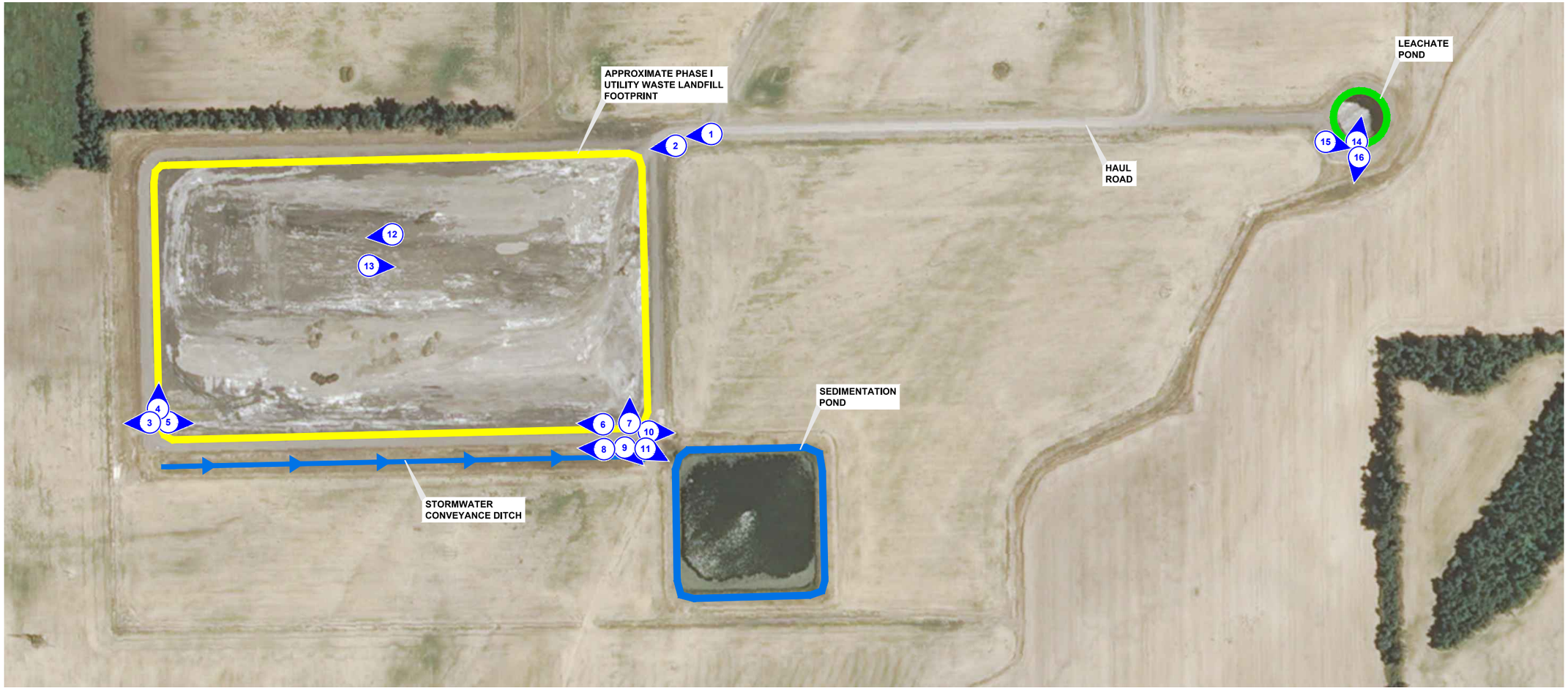
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT
LANDFILL INSPECTION

SITE MAP

SCALE: AS SHOWN
JANUARY 2016

FIGURE 2

BLEVINS, BRETT Printed: 1/15/2016 1:29 PM Layout: SITE MAP
G:\40616_AECI-CCR ELG MANAGEMENT SUPPORT\CAD-NM\LF PH I INSPECTION\FIGURES\40616_FIG-2_SITE PLAN.DWG



LEGEND

NO — PHOTO LOCATION/DIRECTION

NOTES

1. AERIAL PHOTOGRAPH BASED ON LIDAR DATA PROVIDED BY PICTOMETRY INTERNATIONAL CORP. AERIAL SURVEY CONDUCTED BETWEEN 10/4/14 AND 10/8/14.
2. FIELD INSPECTION WAS PERFORMED ON DECEMBER 16, 2015.

N

0 300 600

SCALE IN FEET

HALEY ALDRICH

ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT
LANDFILL INSPECTION

PHOTO LOCATIONS MAP

SCALE: AS SHOWN
JANUARY 2016

FIGURE 3

BLEVINS, BRETT Printed: 1/15/2016 1:29 PM Layout: SITE MAP
G:\40616_AEGI-CCR ELG MANAGEMENT SUPPORT\CAD-NMLF PH I INSPECTION\FIGURES\40616_FIG-3_PHOTO LOCATIONS.DWG

APPENDIX A

Photographs

Photograph No. 1
AECI UWL Inspection
Haul road approaching northeast landfill corner

Photograph No. 2
AECI UWL Inspection
Sign posted along haul road northeast of landfill

Photograph No. 3
AECI UWL Inspection
Inspection leachate collection manhole cover and electrical control box for pump

Photograph No. 4
AECI UWL Inspection
Western landfill face and perimeter berm/road

Photograph No. 5
AECI UWL Inspection
Southern landfill face and rock protection at stormwater pipe

Photograph No. 6
AECI UWL Inspection
Southern landfill face and perimeter berm/road

Photograph No. 7
AECI UWL Inspection
Eastern landfill face

Photograph No. 8
AECI UWL Inspection
Stormwater drainage ditch

Photograph No. 9
AECI UWL Inspection
Stormwater pipe from drainage ditch to sedimentation pond

Photograph No. 10
AECI UWL Inspection
Mobile pump unit, pumping from sedimentation pond

Photograph No. 11
AECI UWL Inspection
Sedimentation pond

Photograph No. 12
AECI UWL Inspection
Top of landfill; bulldozer used for CCR grading

Photograph No. 13
AECI UWL Inspection
Top of landfill

Photograph No. 14
AECI UWL Inspection
Leachate collection pond

Photograph No. 15
AECI UWL Inspection
Leachate loadout structure

Photograph No. 16
AECI UWL Inspection
Leachate loadout pump structure cover, electrical control box for pump

APPENDIX B

Inspection Forms

Annual CCR Landfill Inspection Report

Facility Name: AECI NMPP UWL Inspection Date: 16 December 2015

Owner/Operator: AECI New Madrid Power Plant

Persons Present During Inspection		
Name	**Title/Position**	**Representing**
Greg Garrett	Engineer	Haley & Aldrich
Brett Blevins	Engineer	Haley & Aldrich
Person Responsible for Inspection		
Steven F. Putrich, P.E.	Engineer	Haley & Aldrich

Operations Record Review				
Item	**Comments/Observations**	NO ACTION	MONITOR	REPAIR
Are weekly inspections being performed and records kept in the facility record?	Yes, weekly inspections and reports are performed by AECI and kept in the landfill operating record.	x		
Has facility record been reviewed as part of this inspection?	Yes, 7-day inspection records were reviewed.	x		

Facility Operations	**Comments/Observations**	NO ACTION	MONITOR	REPAIR
Is facility access restricted by fences, gates, etc. to control access?	Yes, access is restricted by fencity and security check-in to plant facility.	x		
Is CCR placement consistent with design plans?	Yes, placement of CCR and configuration of the landfill appears to be in accordance with Phase I Construction Drawings and Construction Permit Application.	x		
Is CCR being placed in lifts and compactive effort applied?	Yes, CCR is trucked in and spread in 4-6 inch lifts. Compactive effort is achieved through dozer compaction.	x		
Is CCR being placed in a manner to promote positive drainage?	Yes, positive drainage was being maintained.	x		
Is there evidence of water ponding in the active fill area?	No evidence of water was observed at the time of the inspection.	x		
Is the liner system and leachate collection system being maintained and operating properly?	Yes. The leachate collection system, including the Phase I pump and the leachate collection pond loadout pump were operating as designed, per discussion with plant personnel.	x		
Are haul roads properly maintained and generally in good condition?	Yes. No further comment.	x		

Facility Operations (cont'd)	Comments/Observations	NO ACTION	MONITOR	REPAIR
Are stormwater run-on and run-off controls being maintained?	Yes. Perimeter berms control both run-on and run-off. The stormwater pipes, ditch, and sedimentation pond were operating in accordance with intended design.	x		
Is there evidence of discharges to Waters of the U.S. ?	No. Run-off is controlled by perimeter berms.	x		

Stability	Comments/Observations	NO ACTION	MONITOR	REPAIR
Is there evidence of erosion on fill slopes or in-active landfill areas?	Erosion rills in ash of approximately 6-12 inches were observed on side slopes. Small erosion rills should be monitored.		x	x
Is there evidence of surface cracking at top of CCR fill or along any slope benches?	None observed at the time of the inspection.	x		
Is there evidence of sinkholes or animal burrows?	None observed at the time of the inspection.	x		
Are fill slopes in accordance with design plans?	Yes, fill slopes were estimated to be roughly 4(h):1(v) in accordance with the design plans.	x		
Is there evidence of slides, sloughs or scarps?	None observed at the time of the inspection.	x		
Is there any evidence of water seepage through fill slopes or at toe of fill slopes?	None observed at the time of the inspection.	x		
Is there evidence of movement, erosion, or instability in any soil embankments retaining CCR at the landfill?	No evidence of movement, erosion, or instability in the perimeter berms was observed.	x		
Is vegetation present in in-active/closed landfill areas? Comment on density, height, and type.	No intermediate cover in place at time of inspection. Vegetation was not present in placed ash.	x		

Additional Comments:

See photos/figures in inspection report for further documentation. Continue to monitor smaller erosion rills and consider repair, consistent with current side-slope maintenance operations, if they exceed 12" or more deep.